Montana Department of Transportation
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Helena, MT 59620-1001

Memorandum

To: Kent M. Barnes, P.E.
Bridge Engineer

From: Nigel Mends, P.E.
Bridge Area Engineer-Missoula

Date: August 26, 2009

Subject: BR 9045(37)
Cabinet Gorge – 1 Mile West of Heron
Control Number 6286
Project Work Type Number 220 - Bridge Replacement with added capacity

Please approve the attached Preliminary Field Review Report.

Approved _____ Date _____
Kent M. Barnes, P.E.
Bridge Engineer

We request comments from the people on the distribution list. We will assume their concurrence if we receive no comments within two weeks of the approval date:

Distribution:

Doug Moeller, District Administrator
Kent Barnes, Bridge Engineer
Tom Martin, Environmental Services Bureau Chief
Duane Williams, Traffic and Safety Engineer
John Horton, Right-of-Way Bureau Chief
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Jake Goettle, Construction Engineering Services Bureau
Matt Strizich, Materials Engineer
Paul Ferry, Highways Engineer

cc:

Dave Jensen, Fiscal Programming Supervisor
Nigel Mends, Project Design Manager
Sanders County Commissioners
Damian Krings, Road Design Engineer (if involved)

e-copies:

Jim Walther, Preconstruction Engineer
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Mark Goodman, Hydraulics Engineer
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Bonnie Gundrum, Env. Bureau Resources Section
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Alice Flesch, ADA Coordinator
Mark Keeffe, Bicycle/Pedestrian Coordinator
Wayne Noem, Secondary Roads Engineer
Jason Sorenson, Engineering Cost Analyst
Jean Riley, Planner

Preliminary Field Review Report

BR 9045(37)
Project Manager: Nigel Mends, PE

Introduction

The following people attended a preliminary field review for this project on 2 July 2008.

Ben Nunnallee, District Projects Engineer, Missoula
Bill Squires, Missoula Area Engineer, Helena
Mark French, Design Supervisor, Missoula Road Crew, Helena
Wayne Noem, Secondary Roads Engineer, Helena
Tyrel Murfitt, CE Specialist II, Helena
Bret Boundy, Missoula Geotechnical Engineer, Helena
Suzan Patterson, Right-of-Way Design Supervisor, Missoula

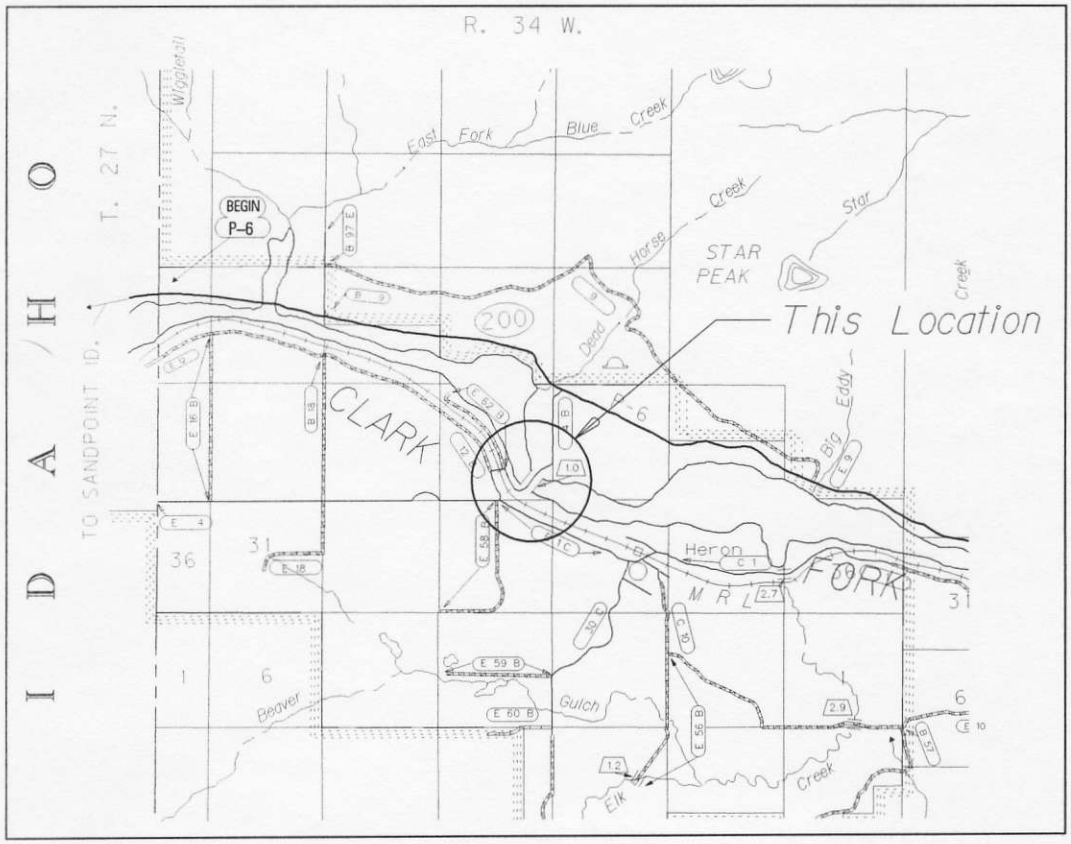
Proposed Scope of Work

The scope of work we propose is to replace the existing bridge and to modify the approaches on both sides of the river to fit the new alignment. Replacement versus rehabilitation of the existing bridge was determined to be appropriate based on cost and function.

Purpose and Need

The purpose of the project is to provide a new bridge that will carry two-lane traffic across the river and provide capacity for current design trucks. The structure is functionally obsolete and eligible for replacement. Sanders County identified replacement of the bridge as its first priority. The existing bridge is posted with a 12-ton load limit and has only a single lane.

Project Location and Limits



This project site is on Heron Road in Section 28, Township 27 North, Range 34 West, in the northwest corner of Sanders County. It crosses the Clark Fork and the Cabinet Gorge Reservoir approximately one-and-a-half miles west of Heron and roughly three-and-a-half miles east of the Idaho border, connecting a local road with Montana 200. The current bridge has the identification number L 45 025 001+0.0001 in the bridge inventory.

The project length is undetermined at this point. We will investigate different options for vertical and horizontal alignments. The option chosen will determine the project length, and will be documented in the Alignment & Grade Review Report.

Work Zone Safety and Mobility

At this time we anticipate Level 3 construction zone impacts for this project as defined in the Work Zone Safety and Mobility (WZSM) guidance. The plans package will include a Transportation Management Plan (TMP) consisting mainly of a Traffic Control Plan (TCP). We will inform the public through public meetings. These issues are discussed in more detail under the Traffic Control and Public Involvement sections.

Physical Characteristics

This steel truss bridge gives Heron, a town of about 150 people, access across the Cabinet Gorge to Montana 200. The bridge was originally built about 1930 as part of a Forest Highway project by the Bureau of Public Roads, across the Clark Fork at Trout Creek, about 24 miles northwest of Thompson Falls. The Bureau of Public Roads replaced the bridge at Trout Creek bridge in 1952. In that same year Sanders County awarded a contract to dismantle the existing bridge and re-build it at its current location near Heron. It now crosses a gorge with steep sides containing the reservoir. From the bridge plans the gorge appears to be about 80 feet deep, measured from the banks. The bridge is 695 feet long.

Heron Road now goes south from Montana 200, crosses the bridge and bends to the west to cross the railroad tracks before intersecting Railroad Avenue (see aerial view from Google Maps on next page). Heron Road is about 18 ft 4 in wide at the bridge and widens to 24 ft wide 100 feet back from the bridge. The surface consists of road mix in poor condition that may have been chip sealed, with large areas of patches and potholes, typical of a low volume county road.

The gorge lies in a broad fluvial valley cut through a mountainous region. The area is rural.

Going north from the bridge Heron Road is on a 400-foot sag vertical grade with tangents of -4% and +10% and a vertical PI 262 feet off the end of the bridge. Horizontally the road lies on a tangent for the first 140 feet, then bears to the right on a 326-foot curve with $\Delta = 50° 30"$ and tangent lengths of 180.15 feet and a PI 320 feet from the end of the bridge. The curve's 382.0-foot radius and 9% superelevation correspond to a nominal design speed of 38 mph.

Off the south end of the bridge the road climbs on a sag vertical curve 200 feet long with one tangent on a -2% grade. The other grade is illegible on the as-built plans but appears to be about +2%. The VPI is 100 feet from the end of the bridge. The horizontal alignment is tangent.

The horizontal curve that ends about 365 feet south of the bridge has a radius of about 165 feet, giving it a nominal design speed of approximately 25 mph.

The area is forested. One house lies on the north bank of the river. The rest of the north side is largely Forest Service land, part of the Kootenai National Forest. The south side of the bridge is primarily private property, with the nearest residence about 300 feet south of the bridge, on the east side of Heron Road.

Year built	1952
Total length, ft.	695
Width (curb-to-curb), ft.	18.0
Number of spans	12
Span lengths	15 ft-15 ft-15 ft-15 ft-15 ft-15 ft-15 ft-100 ft-360 ft-100 ft-15 ft-15 ft
Bridge rail type	Steel thrie beam on steel posts
Structure type	Timber approach spans with cantilevered steel truss spans supporting a central truss span by pin-and-hangar
Abutment type	concrete
Sufficiency Rating	42.1
Structure status	Functionally obsolete – Eligible for Replacement

Traffic Data

We have requested traffic data. A study performed by Morrison-Maierle estimated traffic volumes at an ADT of 700 vehicles. They also project an ADT for 2026 of 1100 vehicles.

Accident Analysis

Safety Management reports that for the ten-year period from 1 January 1999 to 31 December 2008 the Montana Highway Patrol records show nine crashes on Heron Road. There was one injury crash in the curve to the south of the bridge. In the reverse curves to the north of the bridge, they report four crashes (three injury crashes and one property damage only crash). They note that a crash investigator's report shows a vehicle hitting a concrete post, going through the cable rail and overturning just north of the bridge.

Safety Management also requests that we review the alignment and guardrail needs on the approaches to the bridge.

We intend to investigate the possibility of modifying the approach alignment significantly during this project and will replace all approach rail.

Major Design Features

a. **Design Speed.**
A 50 mph design speed is appropriate for a rural local paved road. We will evaluate a lower design speed that is more consistent with the overall character of the road in the vicinity of the river crossing.

b. **Horizontal Alignment**.
The proposed new alignment for the new bridge will require a revised horizontal alignment for the approaches to it. The curve right that begins about 140 feet north of the bridge will be revised (preferably with a larger radius). If the revisions can be limited to this first curve, the length of road work on the north side would be about 950 feet. If the revisions are extended to include the curve left (V = about 30 mph) that begins about 350 feet east of the first curve, it would require approximately an additional 600 feet of roadwork.

On the south side of the bridge, the new alignment will probably extend far enough to require revision of the 165-foot radius curve left that ends about 365 feet south of the bridge. This would require about 1000 feet of new approach roadway. We will try to avoid roadwork beyond this area.

c. **Vertical Alignment**.
The current vertical alignment on the north end of the bridge consists of a 400-foot sag vertical curve with a VPI 262 feet off the bridge with a -4% grade going in and a positive 10% grade coming out.

The south end has a 200-foot vertical curve, with a VPI 100 feet off the end of the bridge. The vertical curve links an apparent -2% followed by a +2% grade adjacent to the bridge.

Since the bridge was designed not for this site but for Trout Creek, the project to build the bridge in this location included building large fills at each approach to raise the grade to accommodate the depth of the truss. At the least, with the new project we will evaluate the possibility of dropping the grade to eliminate those fills. We will also look at dropping the grade further to shorten the bridge, as dirt is a lot cheaper than bridge.

In either case, Department standards require a maximum grade of 8% off the north end of the bridge (to meet 50 mph design speed criteria), which will require re-

constructing the road to accommodate the change.

Until survey and preliminary design are completed, we are unable to determine whether the revised vertical alignment or revised horizontal alignment will be the controlling factor in the extent of road work required. Experience suggests that adjacent landowners will be sensitive to right-of-way impacts. That, and the need to provide acceptable access to the adjacent properties will also be considerations in the development of the horizontal and vertical alignments.

d. **Typical Sections and Surfacing**. We plan to perpetuate the existing 24-foot roadway width, with the exception of the sections adjacent to the bridge ends; the overall width will be increased in these sections to match the proposed 30-foot bridge width and to provide sufficient shy distance for guardrail placement. The included estimate is based on the following surfacing section:

0.25 ft – Commercial Mix – PG 58-28
0.65 ft – Crushed Aggregate Course
4:1 – Surfacing Inslopes
CRS-2P – Seal Oil
Type I – Cover Material

Modifications to the typical section and/or surfacing will be considered after we obtain the traffic data and soil information.

e. **Geotechnical Considerations**.
Mapping of the area shows alluvial and glacial deposits overlying bedrock of dolomitic limestone, sandstone, quartzite and argillite. Water well logs from the houses at each end of the bridge indicate alluvial and glacial materials extending to the bottoms of the wells, which suggests sands and gravels with scattered boulders and clayey zones to at least 30 feet below the channel bottom. The bridge plans show Pier 3 keyed into rock, well above the channel bottom, which likely indicates either a large boulder mis-interpreted as bedrock or a highly variable bedrock surface.

Given deep water and deep gravel deposits with high lateral loads, drilled shafts are most appropriate for intermediate bents, with multiple shafts in the range of four to eight feet in diameter. Larger single shafts per bent would lead to constructability problems, while multiple shafts would provide larger surface area per volume to improve side friction if bedrock is too deep for practical use as foundation material.

Pending further geotechnical investigation, side and end slopes should not exceed 2:1.

While lowering the grade will shorten the bridge and reduce demand for geotechnical capacity, building the new alignment too close to the existing one will require expensive temporary ground support.

f. **Hydraulics**. The proposed replacement bridge over the Clark Fork River is the only major hydraulic feature.
This crossing is located within an approximate delineated floodplain (FIRM panel 720002); a formal floodplain permit will be required.

Hydraulics
A bridge will be required for replacement.

Irrigation
There are no irrigation facilities that will be affected by this project.

Channel
No modifications to the channel are anticipated for permanent construction activities.

g. **Bridges.**
The three long spans in the center of the bridge consist of steel trusses, with the middle span containing a center truss section suspended from the adjacent cantilevered trusses. Through dropping the grade we may be able to create a new bridge as short as 500 feet or possibly even less.

Developing the bridge design will require interaction among the geotechnical parameters, road geometric constraints, and structure types. Since the deepest part of the channel is in the center of the crossing, this site will likely require a design that spans the center. At this time we cannot determine span lengths or pier locations.

The traffic volume in this location requires a roadway width of 30 feet, two lanes of 12 feet each and two shoulders of 3 feet each.

The project will include removal of the existing bridge.

h. **Traffic.**
New signs are proposed for the entire project. The Traffic Engineering Section will develop the pavement marking and signing plans.

i. **Pedestrian, Bicycle, and ADA**.
The proposed facility will represent an upgrade over the current situation. Such low traffic volumes do not warrant the expense of dedicated bicycle or pedestrian facilities. We propose no ADA features.

j. **Miscellaneous Features**.
Miscellaneous features will include guardrail, fencing, and mailboxes. Other miscellaneous features may be identified as the design develops.

k. **Context Sensitive Design Issues**.
We do not anticipate any unusual issues.

Other Projects
There are no other projects planned on this road.

Location Hydraulics Study Report
Floodplains
This project will be analyzed to ensure impacts to the new bridge, floodplain and river will be kept to a minimum, resulting in a Location Hydraulics Study Report.

Design Exceptions
As this is an off-system project, no design exception approvals will be required. Proposed design elements that do not meet design standards will be documented in the scope of work report.

Right-of-Way
Heron Road is a county road that crosses the Clark Fork River over the project bridge. The width of this road easement will need to be determined by future research. New easements and/or construction permits from adjoining landowners will be required. The U.S. Forest Service has title to a strip of land along the river at the northeast end of the bridge. Since the Clark Fork River is navigable, a DNRC easement will be required between the low water marks of the river.

Access Control
We plan to perpetuate the existing access. We do not propose access control.

Intelligent Transportation Systems (ITS) Features
The project will not involve ITS features.

Utilities and Railroads
One steel conduit and two exposed wires are on the west side of the bridge. County personnel believe the conduit contains a telephone line and the other wires have been disconnected.

The project will not involve the railroad.

Survey
See the attached survey request form.

Public Involvement
We intend to implement a Level C public involvement process, modified as shown below, as we do not anticipate this project becoming controversial. If it does, we will expand the process to include a public hearing.

Level C

1. Letter of Intent and News Release explaining the project and including a department point of contact. Contact with a newspaper or papers serving the area to develop a story and graphics that explain and illustrate the proposal. Radio and TV contacts.
2. Personal contacts with adjacent landowners at the time of right of entry and preliminary right of way report.
3. Personal contacts with local officials, interest groups and other organizations.
4. Public information meeting to present basic concepts and information and seek input.
5. An additional public information meeting if the public requests it.

Environmental Considerations
Environmental Services believes that a Categorical Exclusion will be the appropriate environmental document. Wetlands appear to be limited to those areas along the banks of the Clark Fork River. Threatened and Endangered species known to be in the general area include Grizzly Bear, Bull Trout and the outside possibility of Canada lynx. The proposed project is within the Cabinet Yaak Grizzly Bear Recovery zone and within known occupied habitat of grizzlies. Relative to the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, there is an active Bald Eagle's nest in Section 27, T27N R34W, and MDT may need to destroy swallows nests on the existing structure when they are unoccupied prior to demolition. MDT will work through consultation with the USFWS relative to threatened and endangered species and the BGPA, MBTA. Other permits expected include the CoE 404, MFWP SPA-124 and the contractor will have to acquire the MDEQ 318 permit.

MDT's historian will work with the State Historical Preservation Office (SHPO) regarding any requirements if this is a historic structure. Environmental Services hazardous materials section will analyze the proposed project relative to any hazardous materials issues.

Energy Savings and Eco-Friendly Considerations
We do not anticipate particular features in the project at this time, but they may become part of it as the project develops.

Traffic Control
This project consists of a low volume road, which we will keep open to use as the detour during construction. As such, it will be a Level 3 project, with traffic control largely consisting of measures to keep traffic out of the adjacent construction site.

Project Management

The Bridge Bureau, Missoula District, will prepare the bridge plans and manage the project. The Helena Road Design crew, Missoula District, will prepare the road plans. This project is not under full FHWA oversight.

Preliminary Cost Estimate

Cost Estimate

	without IDC	with IDC (17.48%)
New Structure	$10,000,000	
Remove Structure	$335,000	
Road Work	$330,000	
Traffic Control	$35,000	
Subtotal	$10,700,000	$12,570,000
Mobilization (18%)	$1,926,000	
Subtotal	$12,626,000	$14,833,000
Contingencies (10%)	$1,263,000	
Subtotal	$13,889,000	$16,317,000
Inflation (3% for 5	$2,212,000	$2,599,000
Total CN	$16,101,000	$18,915,000
CE (15%)	$2,415,000	$2,837,000

Ready Date

The ready date will be established through the OPX2 override process. The letting date is currently outside the Tentative Construction Plan (TCP). The target letting date is beyond 2015.